

Aquaponics Lab

How to make a basestation using a Raspberry Pi

Here we cover the hardware options for making an aquaponics control system base station using a Raspberry Pi.

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INTRODUCTION

Here we take you through the hardware you'll need together with the options for extending the basestation.



PARTS:

- [Raspberry Pi](#) (1)

Model B+

You can use any type but B+ is best

- [Plug-top micro usb power supply](#) (1)
- [Industrial 5V 15W power supply - optional upgrade replaces plug-top power supply](#) (1)
- [Optional Battery back-up board](#) (1)

Different battery capacities are available

- [Enclosure for basestation](#) (1)
 - [RFM12B Radio Module](#) (1)
 - [RFM12B Breakout board](#) (1)
 - [Optional Wifi Dongle](#) (1)
 - [Optional 3G Dongle](#) (1)
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Step 1 — Choose your options: Battery back up and Power Supply



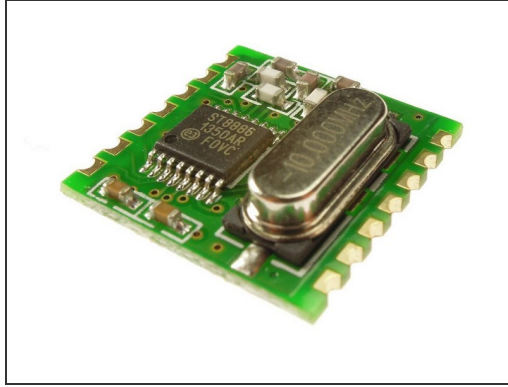
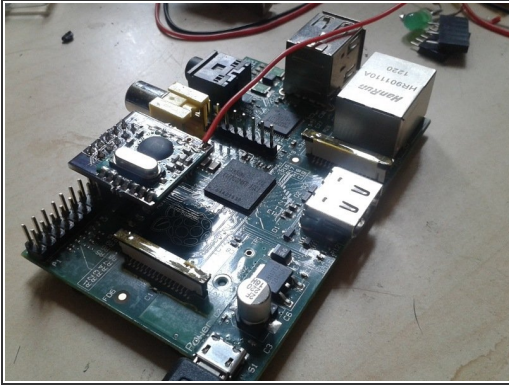
- An optional **battery back-up board** is shown here with the battery itself wrapped in blue tape. This one is the UPiS and is made for the older models of Raspberry Pi by pimodules - but they have just announced a version designed for the new B+ and A+ models. It looks better and is also cheaper!
- You *can* use a **micro-usb plug-top power supply** - but if you do, make sure it's a good one, **ratec to at least 2A** (the Pi won't use this much, but it is good to overspecify here). Watch out for cheap fakes!
- We recommend using an **industrial grade power supply** because it gives rock solid power and long-term reliability. You will usually need to make a cable to go into the Pi. To make a micro-usb connection I suggest cutting a pre-made cable rather than trying to attach a micro usb connector yourself - the connectors are very fiddly!

Step 2 — Choose your box



- Lots of choices here, I really like to have the electronics visible through a transparent lid, but you can save a few pennies if you don't want to gaze at the electronics for some reason. About the smallest sized box for a basestation is **139x78x80mm** - this means I can just squeeze the power supply below the pi.
- Larger sized boxes make it a bit easier to attach cables and so on. A neat feature of the **Hylec box** we've used is that you can attach a cable gland neatly as the threaded hole is already in place.
- For tight fits we found these little **USB swivel adaptors** useful - using these you can 'fold' a larger wifi or 3G dongle back over the top of the Raspberry Pi itself.

Step 3 — Radio Module and optional wifi



- We use the **RFM12B radio modules** both in the basestation and in the sensors. I found some breakout boards on [ebay](#) but you can also get them from tindy and other places.
- The radio modules come in different frequencies - 434MHz is global, whereas 868MHz is for Europe and 915MHz is for America. If you want to use them elsewhere check out your local regulations.
- When buying a **wifi dongle** it's worth getting one with a chipset that the Pi plays nicely with. Check out the comprehensive list over at [elinux](#) for guidance here.

Step 4 — 3G dongle option and putting it all together



- If you want to provide backup connectivity and/or directly send of text message alerts you can use a **3G dongle**. I just looked for well supported models on [elinux](https://elinux.org) and then bought one second hand on ebay.
- Now secure the power supply in the box, mount the Pi on some 35mm M2.5 standoffs, and you're **good to go!**
- But what piece of modern hardware would be complete without some software? You'll need to have either an **SD card** for the Pi models A or B, or a **micro SD card** for the newer models A+ or B+. 4GB is enough but again, be careful of buying the cheapest ones you can - better to spend a little extra and try to avoid fakes.